

**Attachment 12**  
**SCOPE OF WORK FOR A CORRECTIVE MEASURES STUDY (CMS)**

**I. PURPOSE**

The purpose of the Corrective Measure Study (CMS) is to develop and evaluate the corrective action alternative or alternatives and to recommend the corrective measure or measures to be taken at Respondent's facility. The Respondent will furnish the personnel, materials, and services necessary to prepare the corrective measure study, except as otherwise specified.

**A. SCOPE** - The Corrective Measure Study consists of the following tasks:

1. Evaluation of the Corrective Measure Alternative or Alternatives
2. Justification and Recommendation of the Corrective Measure or Measures
3. CMS Report
4. Periodic Reports

**II. Evaluation of the Corrective Measure Alternative or Alternatives**

The following criteria shall be used to evaluate each corrective measure alternative and its components that are evaluated for the CMS Report based on technical, environmental, human health and institutional concerns. The evaluation shall also include a cost estimate for each corrective measure.

**A. Technical, Environmental, Human Health, and Institutional Factors**

1. Technical
  - a. Performance - The Respondent shall evaluate performance based on the effectiveness and useful life of the corrective measure:

- (i) Effectiveness shall be evaluated in terms of ability to perform intended functions, such as containment, diversion, removal, destruction, or treatment. The effectiveness of each corrective measure shall be determined either through design specifications or by performance criteria. Any specific waste or site characteristics which could potentially impede effectiveness shall be considered. The evaluation should also consider the effectiveness of combinations of technologies; and,
- (ii) Useful life is defined as the length of time the level of effectiveness can be maintained. Most corrective measure technologies, with the exception of destruction, deteriorate with time. Often, deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each corrective measure shall be evaluated in terms of the projected service lives of its component technologies. Resource availability in the future life of the technology, as well as appropriateness of the technologies, must be considered in estimating the useful life of the project.

b. Reliability - The reliability of each corrective measure shall be evaluated including its operation and maintenance requirements and its demonstrated reliability:

- (i) Operations and maintenance requirements include the frequency and complexity of necessary operation and

maintenance. Technologies requiring frequent or complex operation and maintenance activities should be regarded as less reliable than technologies requiring little or straightforward operation and maintenance. The availability of labor and materials to meet these requirements shall also be considered; and

- (ii) Demonstrated and expected reliability is a way of measuring the risk and effect of failure. The Respondent should evaluate whether the technologies have been used effectively under analogous conditions; whether the combination of technologies have been used together effectively; whether failure of any one technology has an immediate impact on receptors; and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

- c. Implementability - The Respondent shall evaluate the implementability of each corrective measure including the relative ease of installation (constructability) and the time required to achieve a given level of response:

- (i) Constructability is determined by the conditions both internal and external to the facility conditions and include such items as location of underground utilities, depth to the water table, heterogeneity of subsurface materials, and location of the facility (i.e., remote location vs. congested urban area). The Respondent shall evaluate what measures can be

taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities; and

(ii) Time has two components that shall be addressed: the time it takes to implement a corrective measure and the time it takes to actually see beneficial results. Beneficial results are defined as the reduction of contaminants to some acceptable, pre-established level.

d. Safety - The Respondent shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments as well as those workers during implementation. Factors to consider are fire, explosion, and exposure to hazardous substances.

2. Environmental - The Respondent shall conduct an environmental assessment for each alternative focusing on the facility conditions and pathways of contamination actually addressed by each alternative. The environmental assessment for each alternative shall include, at a minimum, an evaluation of: the short- and long-term beneficial and adverse effects on environmentally sensitive areas and an analysis of measures to mitigate adverse effects.

3. Human Health - The Respondent shall assess each alternative in terms of the extent to which it mitigates short- and long-term potential exposure to any residual contamination and protects human health both during and after implementation of the corrective measure. The assessment shall consider the levels and

characterizations of contaminants on-site, potential exposure routes, and potentially affected populations. Each alternative shall be evaluated to determine the level of exposure to contaminants and the reduction over time. For management of mitigation measures, the relative reduction of impact will be determined by comparing residual levels of each alternative with existing criteria, standards, or guidelines acceptable to EPA.

4. Institutional - The Respondent shall assess relevant institutional needs for each alternative, including the effects of Federal, state and local environmental and public health standards, regulations, guidance, advisories, ordinances, or community relations on the design, operation, and timing of each alternative.
5. Other - The Respondent may evaluate such other factors as may be relevant in the selection of the corrective measure(s), if any, for the facility.

#### **B. Cost Estimate**

The Respondent shall develop an estimate of the cost of each corrective measure alternative (and for each phase or segment of the alternative). The cost estimate shall include both capital and operation and maintenance costs.

1. Capital costs consist of direct (construction) and indirect (nonconstruction and overhead) costs.
  - a. Direct capital costs include:
    - (i) Construction costs, i.e., costs of materials, labor, and equipment required to install the corrective measure;

- (ii) Equipment costs, i.e., costs of treatment, containment, disposal and/or service equipment necessary to implement the corrective action;
- (iii) Land and site development costs, i.e., expenses associated with the purchase of land and development of existing property; and
- (iv) Buildings and services costs, i.e., costs of process and nonprocess buildings, utility connections, purchased services, and disposal costs.

b. Indirect capital costs include:

- (i) Engineering expenses, i.e., costs of administration, design, construction supervision, drafting, and testing of corrective measure alternatives;
- (ii) Legal fees and license or permit costs, i.e., administrative and technical costs necessary to obtain licenses and permits for installation and operation;
- (iii) Startup and shakedown costs, i.e., costs incurred during corrective measure startup; and
- (iv) Contingency allowances, i.e., funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, and inadequate facility characterization.

2. Operation and Maintenance costs are post-construction costs necessary to ensure continued effectiveness of a corrective measure. The Respondent shall consider the following operation and maintenance cost components:

- a. Operating labor costs, i.e., wages, salaries, training, overhead, and fringe benefits associated with the labor needed for post-construction operations;
- b. Maintenance materials and labor costs, i.e., costs for labor, parts, and other resources required for routine maintenance of facilities and equipment;
- c. Auxiliary materials and energy, i.e., costs of such items as chemicals and electricity for treatment plant operations, water, sewer service, and fuel;
- d. Purchased services, i.e., sampling costs, laboratory fees, and professional fees for which the need can be predicted;
- e. Disposal and treatment costs, i.e., costs of transporting, treating, and disposing of waste materials, such as treatment plant residues, generated during operations;
- f. Administrative costs, i.e., costs associated with administration of corrective measure operation and maintenance not included under other categories;
- g. Insurance, taxes, and licensing costs, i.e., costs of such items as liability and sudden accidental insurance; real estate taxes on purchased land or rights-of-way, licensing fees for certain technologies, and permit renewal and reporting costs;
- h. Maintenance reserve and contingency funds, i.e., annual payments into escrow funds to cover (1) costs of anticipated replacement or rebuilding of equipment and (2) any large unanticipated operation and maintenance costs; and
- i. Other costs, i.e., items that do not fit any of the above categories.

### **III. Justification and Recommendation of the Corrective Measure or Measures**

The CMS Report shall include Respondent's recommendation, with justification, of the appropriate corrective measure alternative based upon the evaluation of the remedial alternatives. This recommendation shall include summary tables which allow comparisons of the alternative or alternatives to be easily understood. Tradeoffs among health risks, environmental effects, and other pertinent factors shall be highlighted.

### **IV. CMS Report**

The CMS Report shall present the results of the evaluation of the corrective measure alternatives and of the justification and recommendation of the corrective measure(s) and include the recommended corrective measure alternative. The CMS Report shall include:

- A.** The CMS Report shall contain an update to the information describing the current conditions at the facility and the known nature and extent of contamination as documented by the RFI Report. It shall also include a facility-specific statement of the purpose for the response measures, based on the results of the RFI. The statement of purpose should identify the actual or potential exposure pathways that should be addressed by corrective measures.
- B.** The CMS Report shall include a statement of the corrective action objectives and an explanation of the basis for these objectives in terms of the following criteria:
  - 1. Public health and environmental protection;
  - 2. Information gathered during the RFI;
  - 3. EPA Guidance; and
  - 4. The requirements of any applicable Federal statutes.



At a minimum, all corrective actions concerning groundwater releases from regulated units must be consistent with, and as stringent as, those required under 40 C.F.R. 264.100.

- C. The CMS Report shall include the initial screening of corrective measure technologies used to eliminate those technologies which have severe limitations for a given set of waste and site-specific conditions or which have inherent technology limitations. The CMS Report shall include a detailed description of how each of these technologies compare with the criteria set forth below and shall identify those technologies that, based on these criteria, are infeasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that would not achieve the corrective measure objective within a reasonable time period. The criteria are as follows:
1. Site Characteristics-- Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies the use of which are clearly precluded by site characteristics should be eliminated from further consideration.
  2. Waste Characteristics-- Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by these waste characteristics should be eliminated from consideration.
  3. Technology Limitations-- During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process. For example, certain treatment methods have been developed to a point where they can be implemented in the field without extensive technology transfer or development.

- D.** The CMS Report shall include a detailed description of how Respondent used good engineering practice to develop the corrective measure alternative or alternatives based on the corrective action objectives and analysis. Technologies can be combined to form the overall corrective action alternative or alternatives. The alternative or alternatives developed should represent a workable number of option(s) that each appear to adequately address all site problems and corrective action objectives. Each alternative may consist of an individual technology or a combination of technologies.
- E.** The CMS Report shall set forth in detail the evaluation of corrective action alternatives using the factors set forth in Task V, Evaluation of the Corrective Measure Alternative or Alternatives, below.
- F.** The CMS Report shall include the corrective measures objectives developed in accordance with paragraph B above.
- G.** A description of the screening of corrective measures technologies conducted pursuant to paragraph C above, including the following:
1. Review of Facility data that may limit or promote the use of certain technologies;
  2. Identification of waste characteristics that limit the effectiveness or feasibility of technologies; and
  3. Identification of the level of technology development, performance record, and inherent construction, operation and maintenance problems for each technology considered.
- H.** A description of the recommended corrective measure or measures meeting the requirements set forth in Task VI, including:

1. Description of the corrective measure or measures and rationale for selection;
  2. Performance expectations;
  3. Preliminary design criteria and rationale;
  4. General operation and maintenance requirements; and
  5. Long-term monitoring requirements.
- I.** A summary of the RFI and impact on the selected corrective measure or measures;
1. Field studies (groundwater, surface water, soil, air); and
  2. Laboratory studies (bench scale, pilot scale).
- J.** Design and Implementation Precautions;
1. Special technical problems;
  2. Additional engineering data required;
  3. Permits and regulatory requirements;
  4. Access, easements, right-of-way;
  5. Health and safety requirements; and
  6. Community relations activities.
- K.** Cost Estimates and Schedules;
1. Capital cost estimates;
  2. Operation and maintenance cost estimate; and
  3. Project schedule (design, construction, operation).

**V. Periodic Reports**

Periodic Reports will be submitted as required by the Order.